

Telegraphic Ground Currents are reported by the observers as follows: Santa Fe, on the 2d, 10th, 24th, 25th and 26th; Pike's Peak, on the 6th.

OPTICAL PHENOMENA.

Solar Halos.—1st, Ohio, Dak., Ga. 2nd, Dak., Miss., Tenn., Wis. 3rd, Ill., N. Y., Ohio, Mich., S. C. 4th, Me., N. H., N. Y., Tex., Mich. 5th, N. Y., Dak. 6th, Iowa, N. Y. 7th, Fla., Ill., Md., Mich., Neb., Ohio, Ind., S. C. 8th, Del., Md., Mich., N. J. 9th, Iowa, Mass., Mich., N. Y., Conn., Minn. 10th, Iowa, La., Miss., Ohio, Tex., Mich., Minn., Mon. 11th, Ill., Iowa, Mich., N. Y., Wis., Ind., Minn. 12th, Iowa, Mich., Wis., S. C., Minn., Kan., N. C. 13th, Ill., Ind., N. J., N. Y., Ohio, Penn., Wyo., Col., Tex., Conn. 14th, Iowa, Me., Md., Mo., Neb., N. H., N. Y., Conn., R. I. 15th, Iowa, N. H., Mich., Wyo. 16th, Ind., Me., N. H., N. Y., Ohio, R. I., La. 17th, Ga., Me., Mich., Ohio, Wis., N. J., S. C., Ky., Ala. 18th, Ill., N. Y., Ga. 21st, Ark., Ind. Ty. 22nd, N. J., Tenn. 23rd, Conn., Del., Ill., Mass., N. J., N. Y., Tenn., R. I. 24th, Ill., Ky., N. Y., Ala. 25th, Ill., Iowa, Mass., Ohio, Vt. 26th, Ill., Ind., N. J., N. Y., Ohio, Penn., S. C. 27th, Conn., Me., Mass., Mich., N. H., N. Y., Ohio, Vt., S. C., R. I. 28th, Me., N. H., 29th, Iowa, Tenn. 30th, Tenn., Tex.

Lunar Halos.—1st, Ohio, N. C. 3rd, Ind. 16th, Mass. 17th, Dak., N. Mex. 18th, Dak., S. C., Minn., N. Mex. 19th, N. J., Ohio, Minn., Dak., Minn., N. C. 20th, Del., Kan., Mass., Mo., N. J., Tex., Minn., N. C. 21st, Fla., N. J., N. Y., Ind. Ty., Kan., Ga., N. C., La. 22nd, Fla., Iowa, Kan., Mo., N. J., N. Y., Mich., La., Conn., N. C. 23rd, Conn., Ill., Iowa, Mich., Mass., Minn., Ohio, Ind., Tenn., Ala., Fla. 24th, Iowa, Kan., Ky., Neb., N. H., N. J., N. Y., N. C., Ohio, Dak., Minn., Col., Me., Ind., Fla., R. I., Ga., Conn. 25th, Ill., Ind., Ohio, Wis., Iowa, S. C., Va., N. C., W. Va., La., Minn. 26th, Conn., Ind., Mass., N. Y., Ga., Minn., Ill., Me., R. I., Ohio. 27th, Ky., Me., N. H., Ohio, Tenn., Minn., Ga. 28th, Ind. 29th, Tenn. 30th, Tenn.

Mirage.—Fort Pembina, Dak., 2nd; Duluth, Minn., 7th, 21st; Marquette, Mich., 19th; Atlantic City, N. J., 24th.

Scintillation of Stars.—No observations of scintillation have been received for April.

MISCELLANEOUS PHENOMENA.

Zoo'logical.—BOTANICAL.—The blooming of flowers and trees have been reported as follows: *Anemones*, 17th, Mass. *Dandelions*, 19th, Mass. *Apricots* in bloom, 1st, Md.; 15th, Kan.; 16th, N. J.; 26th, Penn. *Apple trees* in bloom, 15th, Ind., (first bloom;) 20th, Ohio; 22nd, W. Va.; 26th, Ohio; 28th, Ill.; 30th, Mo., (full bloom,) Ind. *Blackberries*, 16th, La., (ripe.) *Crab Apples* in bloom, 29th, Kan. *Currants*, 20th, Ohio. *Cherry* in bloom, 4th, Va.; 8th, Md.; 15th, Kan.; 20th, Ill.; 22nd, Md., N. J.; 23rd, Kan.; 24th, W. Va.; 25th, N. J.; 26th, N. Y.; 27th, N. J.; 28th, N. Y.; 29th, Ohio; 30th, Mo., Ohio, Ind. *Fever Bush* in bloom, 25th, Mass. *Magnolias* in bloom, 23rd, Mass., (full bloom.) *Maples* in bloom, 20th, Mass., (red maple.) *Peach* in bloom, 4th, Ill.; 6th, Kan.; 8th, Md.; 14th, Ky.; 15th, Kan.; 17th, Md., N. J.; 21st, Neb., (full bloom;) 22nd, Ill.; 23rd, Neb.; 24th, N. J., Ohio; 26th, N. Y., Penn.; 30th, Ind. *Pear trees* in bloom, 4th, Va.; 12th, N. J.; 16th, N. J.; 19th, Ind., (full bloom,) Ohio; 23rd, N. J.; 26th, Ohio, Penn.; 30th, Mo., N. J., Ohio, Ind. *Plum* in bloom, 12th, Kan.; 13th, Kan.; 15th, Kan.; 17th, Md.; 19th, Ill.; 20th, Ill., Ohio; 21st, Neb.; 22nd, Neb.; 24th, W. Va.; 26th, Ohio. *Strawberries* in bloom, 4th, Ill.; 16th, N. J.; 26th, Ohio. *Willow trees* in bloom, 19th, Mass. *Violets* in bloom, 17th, Mass., (Dogtooth;) 26th, Mass., (blue.)

BIRDS.—The first arrival and their migrations are reported as follows: *Bluebirds*, 1st, Wis.; 3rd, Wis.; 4th, Ohio; 12th, Minn.; 24th, Utah. *Blackbirds*, 1st, Somerset, Mass., (first seen,) N. H., Wis.; 2nd, Vt.; 3rd, Me., flying N., Wis.; 4th, Iowa, N. Y.; 10th, Iowa; 12th, Minn., N. H., N. Y.; 14th, Vt.; 22nd, Dak.; 26th, Utah. *Calbirds*, 23rd, Va. *Cranes*, 1st, Wis., N.; 4th, Iowa, N.; 10th, Iowa, N. *Ducks*, 1st, N. Y.; 4th, Iowa, N.; 10th, Dak., N. *Wild geese*, 1st, Iowa, S., N. Y., Wis.; 2nd, Kan., NE., Mass., SE., Conn., N.; 3rd, Me., N., Mt. Desert, Me., (first seen,) N. H., N., Mass., N.; 4th, Iowa, N., Me., N., Md., NW.; 8th, Iowa, N., Conn., N.; 9th, Minn., N.; 10th, Me., NE., Dak., N.; 11th, Dak., S. and N., Me., NE.; 13th, Dak., N., Mass., SE.; 14th, Dak., N., Mass., N. and E.; 15th, Conn., E.; 16th, Dak., N.; 17th, Conn., N., Mass., N., N. J., NW.; 19th, Dak., N.; 20th, N. J., N.; 21st, Md., N.; 24th, Mass., N. *Hawks*, 8th, Dak., N. *Kill-dee*, 19th, N. Y. *Larks*, 1st, N. Y.; 2nd, Mass., N. Y.; 3rd, Wis.; 4th, N. Y.; 6th, Ohio; 12th, N. H.; 14th, N. Y.; 24th, Utah. *Martins*, 1st, Md., (first seen,) Penn., Tenn.; 2nd, Kan.; 4th, W. Va.; 7th, Mo.; 10th, Md., N. Y.; 14th, Mass.; 16th, Wis.; 17th, N. J.; 23rd, N. C., Wis.; 24th, Ind., N. Y.; 28th, N. H. *Mocking birds*, 4th, Fla., (singing;) 7th, Kan.; 10th, Ill.; 15th, Va. *Oriole*, 13th, Vt. *Prairie chickens*, 4th, Iowa. *Pigeons*, 19th, Ohio; 25th, Iowa. *Pewee or Phoebe birds*, 2nd, N. Y.; 3rd, Neb., Wis.; 4th, N. Y.; 9th, N. H.; 12th, Ohio; 14th, Vt. *Robins*, 1st, Mass., Wis., Me.; 2nd, N. H., N. Y.; 3rd, Vt., Wis.; 4th, Vt.; 5th, Ohio; 7th, Minn.; 8th, Mich.; 9th, N. Y., Dak.; 11th, Wis.; 17th, Me.; 19th, Cresswell, Kan., (first one seen in six years;) 24th, Utah. *Sniipe*, 1st, N. Y.; 10th, Ill. *Sparrows*, 4th, Vt.; 7th, Me., Ohio, Vt.; 8th, Vt.; 9th, N. H.; 12th, Wis.; 14th, N. Y. *Swallows*, 6th, Miss.; 10th, Kan., Mass.; 11th, Mass.; 12th, N. Y.; 15th, Ohio; 17th, Ill.,

N. J.; 18th, N. Y., Wis.; 20th, Wis.; 21st, N. Mex., (first seen,) Mass., Neb., Wis.; 22nd, Penn.; 23rd, Penn., Wis.; 24th, Iowa, Mass., N. C., Vt.; 25th, N. H.; 26th, N. Y., Penn.; 27th, Me., Ohio; 28th, Conn. *Thrush*, 6th, Mass.; 17th, Ohio. *Whip-poor-will*, 1st Fla.; 15th, Va.; 20th, Ill., Neb.; 21st, Iowa; 22nd, Ind., N. C.; 23rd, Md. *Woodpeckers*, 8th, W. Va.

FISHES.—*Shad*, 11th, Ardenia, N. Y., (first caught.) 13th, Flushing, N. Y., (first caught,) and numerous on the 18th.

INSECTS.—*Grasshoppers*, 7th, at Macon, Ga., blown thither by storm winds. 10th, Howard, Neb., first eggs hatched; Denison, Iowa, hatching during month; at Tabor, Iowa, but few hatched out. 13th, Fort Gibson, Ind. Ty., numerous; Corning, Mo., those hatched in February have disappeared. 23rd, Denison, Tex., first appeared. 30th, Creswell, Kan., nearly all gone; Corsicana, Texas, very numerous, corn and wheat damaged. *Colorado Beet'e, or Potato Bug*, 9th, Wappinger's Falls, N. Y.

Polar Bands.—N. H., Auburn, 1st, 4th, 16th. Miss., Brookhaven, 2nd. Iowa, Tabor, 5th, 18th; Iowa City, 10th, 14th, 16th, 24th; Muscatine, 24th. S. C., Charleston, 6th. Ohio, Carthage, 6th, 7th, 9th, 10th, 12th, 23rd. Ga., Tybee Island, 7th. Va., Wytheville, 7th, 9th, 15th. N. J., Vineland, 8th, Freehold, 22nd. La., Point Pleasant, 10th. Minn., Duluth, 14th, 29th. N. Y., Waterburg and Flushing, 14th; Malone, 24th. Me., Gardiner, 24th, 28th.

Prairie and Forest Fires.—Fort Randall, Dak., 1st, 3rd, 12th; Bismarck, Dak., 14th, 15th, 20th, 21st, 23rd; Monticello, Iowa, 8th; Creswell, Kan., 3rd, 4th, 5th, 6th, 7th, 10th, 13th, 19th, 20th, 29th; near Fall River, Mass., 22nd, raging for three days; St. Paul, Minn., 8th; Genoa, Neb., 15th; Eastport, Me., 27th; Wytheville, Va., 6th, 24th; Morgantown, W. Va., 13th, 14th; Embarrass, Wis., 13th, 22nd; near Scranton, Penn., 15th; Barnegat, N. J., 24th, 25th; Denison, Tex., 10th.

Meteors.—Iowa: Davenport, 1st; Monticello, 20th. Dak.: Yankton, 4th. N. Y.: Wappinger's Falls, 9th, 10th; Flushing, 10th; Vermillion, 11th; Waterburgh, 13th; Cooperstown, 15th. N. H.: Contoocookville, 12th; Auburn, 14th, 21st. Ind.: Vevay, 12th, 13th, 14th. Wis.: Wautoma, 13th. N. J.: Vineland, 14th. Ind.: Bloomington, 15th. D. C.: Washington, 22nd. Ohio: Jacksonburg, 25th. Va.: Wytheville, 27th. Vt. Woodstock, 30th.

Sunsets.—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily at sunset at all Signal Service stations. The monthly summaries from 88 stations show that 98 doubtful cases and blanks were recorded, and that out of the remaining 2,542 cases 2,108, or 82.8 per cent., have been followed by the expected weather.

Zodiacal Light.—Conn., Colebrook, 7th, 9th, 12th. Ga., Savannah, 5th, 6th, 14th. Iowa, Monticello, 1st, 2nd, 4th, 5th, 6th, 7th, 15th, 29th, 30th. Ohio, Bellefontaine, 5th, 9th, 12th. Me., Cornish, 11th. Mass., Somerset, 6th; Fall River, 3rd; Cambridge, 3rd, 6th, 9th, 12th. N. J., Atco, 5th, 6th, 7th, 10th, 12th, 14th, 15th, N. Y., Waterburgh, 2nd, 6th, 7th, 9th, 10th, 11th, 12th, 13th, 14th; North Argyle, 9th. Va., Wytheville, 5th, 6th, 14th, 29th.

Earthquakes.—Panama, 17th, slight shock of short duration, 5:50 a. m. Auburn, N. H., 23rd, slight shock from NW. to SE., at 11 a. m. A slight shock was felt at Franklin, N. C., at 5 p. m. of 26th.

NOTES AND EXTRACTS

In the Paris Comptes Rendus des Academie des Sciences de Paris, for March 12, 1877, and in the Bulletin International de l'Observatoire de Paris, for March 20th, M. de Crova gives some measures showing the variations of the solar heat as received at the earth's surface. Observations were taken on January 4th and July 11th, 1876, continuously throughout these remarkably clear and quiet days. The following are the results of his calculations:

| Total amount of heat received at Paris upon one square centimeter. | JANUARY 4, 1876. | | JULY 11, 1876. | |
|---|---------------------------|----------------------------|---------------------------|----------------------------|
| | Normally to sun's rays. | Upon a horizontal surface. | Normally to sun's rays. | Upon a horizontal surface. |
| | Calories. | Calories. | Calories. | Calories. |
| 1st. Total from sunrise to noon..... | 264.4 | 78.9 | 461.5 | 293.5 |
| 2nd. Total from noon to sunset..... | 270.6 | 82.3 | 424.9 | 280.6 |
| 3rd. Total from sunset to sunrise..... | 935.0 | 161.2 | 876.4 | 571.1 |
| During the hours of sunshine the heat received in one minute varied from. } | 0 to 1.20 | 0 to 0.33 | 0 to 1.21 | 0 to 1.10 |
| The ratios of the total amounts of heat received daily upon normal and horizontal surfaces. } | $\frac{161}{535} = 0.301$ | | $\frac{571}{876} = 0.655$ | |
| The ratios of the heat received on these two days are..... | | | Normally..... } | $\frac{535}{876} = 0.610$ |
| | | | Horizontally. } | $\frac{161}{571} = 0.281$ |